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IV.

~~Introductory Sections~~
Introductory Sections
(~ 3 hrs)

A. ~~Evolution~~ What is life?

1. ~~Genetic~~ definition
2. Metabolic definition
3. Thermodynamic aspects, and reconciliation of ~~biological~~ views; functional vs chemical definitions; analogies with inanimate

B. Unity of life on Earth

1. ~~Genetic~~: nucleic acids, proteins and the code
2. Chemical: alignment of a very few molecules out of many possible
3. Morphological: cells, ^{sub-}cellular organelles, 9+2 flagella structure
4. Common: life on Earth is descended from a single instance of the origin of life

C. Origin of life

3. ~~Comic~~ ^{models of the} clouds and early history of the solar system

1. Direct evidence on the earliest history of the earth and life; time-scales
2. Thermodynamics and the origin of life: probable and improbable events
4. Production of organic molecules in simulated primitive terrestrial environments

6. Possible alternative biochemistries

5. Problems: earliest nucleic-acid protein coupling, aqueous vs. non-aqueous environments, origin of the code, origin of subcellular organelles, origin of the cell, details of subsequent pre-cellular evolution

Q.

D. Current - problems of exobiology

1. Exobiology as a critical approach to fundamental unsolved biological problems; obtaining biological perspectives; geological vs. laboratory time-scales
2. Problems in analysis of organic molecules: examples from organic geochemistry and the study of carbonaceous chondrites; optical activity
3. Problem in search for extraterrestrial life: examples from terrestrial sediments and from carbonaceous chondrites ("organized elements")
4. The contamination problem
5. The panspermia hypothesis
6. A few hypothetical extraterrestrial ecosystems

E. Biological interest in the moon

1. Models of lunar ~~biology~~
prebiological organic synthesis: indigenous
vs. exogenous, ~~process~~
2. Lunar surface and subsurface environments:
temperatures, radiation fields, atmosphere,
~~etc.~~ chemistry
3. Surface and subsurface survival of prebiological organic matter on the moon: Arrhenius plots, ~~&~~ radiation damage.
4. Lunar transient events
- 5*. Possibilities of ^{an} extant or extinct lunar
biology
6. Contamination of the moon: panspermia,
impact spray from the Earth, spacecraft
- 7*. Sites of potential ^{organic chemical} biological interest
in typical Apollo landing areas:
permanently shadowed crevasses, dark halo
craters, ridges, crater walls

(A)

8. Problems in acquisition and storage of human
subcutaneous samples

a. Spoor